Some recent books (continued)

on the many difficult practical problems giving rise to random errors which do not yield to theoretical treatment. The author points out correctly that these can be dealt with only on an *ad hoc* basis, but implies, somewhat misleadingly, that they can be overcome easily.

Although the work deals specifically with sensors and not systems, greater emphasis should have been placed on the importance of the close relationship of the basic design characteristics of the instruments and the system of which they are part. Surprisingly, there is no detailed reference to methods of evaluation and test. Despite these criticisms, this is a very useful addition to the growing literature on inertial navigation, and covers the part of the subject which, so far, has received comparatively little attention. J. DRURY

Basic theory of space communications

F. J. TISCHER

Van Nostrand, 1965. 463 pp. £4 12s.

The author of this 'basic theory' assumes a graduate knowledge of physics or electrical engineering and the appropriate mathematical experience. He begins with an account of Maxwell's equations, vector potentials and Green's functions. On this foundation is based a general account of radiation from aerials; the aperture theory being developed for both rectangular and circular apertures. Separate chapters deal with low-noise aerials and those developed for space vehicles.

The second part considers plasma from the particle approach; an account of relativistic electrodynamics precedes a study of fields and radiation from moving charges. This is followed by a consideration of wave propagation as a macroscopic problem based upon constants for the medium derived from a consideration of particle processes. Accounts are given of propagation in a uniform plasma and also in plasmas that vary in the direction of propagation and the general case of variation along all three axes. This leads to a discussion of the problem of re-entry communications. The book ends with an account of signals and information theory, with chapters on signal processing, modulation, demodulation, correlation reception and detection.

The presentation keeps the physics of the problem clear from the mathematics. Examples for study are given together with bibliographies to each chapter. The whole book is carefully laid out and well presented.

W. T. BLACKBAND

Effects of radiation on semiconductors

V. S. VAVILOV

Consultants Bureau, 1965. 225 pp. $15

The interests of a team of workers studying effects of radiation on semiconductors at the Lebedev Physics Institute in the Soviet Union, and the author's experience of lecturing to senior physics students at Moscow State University, are reflected to a considerable extent in this review monograph which is translated from an original Russian text published in 1963.

Processes of absorption of electromagnetic radiation by semiconductors, photoionisation and photoconductivity, ionisation by charged high-energy particles, and principal types of recombination processes by which an excited crystal returns to its original equilibrium state are dealt with. A separate chapter is devoted to radiative recombination. The formation of structural defects in semiconductors by radiation, and experimental data on changes in the physical properties of semiconductors due to such defects, are also presented.

This authoritative book, with its 277 references, is an important contribution for research workers in the field of semiconductor physics, and will be of considerable interest to engineers concerned with applications of semiconductor electronics.

F. A. BENSON

Michael Faraday†

L. PEARCE WILLIAMS

Chapman & Hall, 1965. 531 pp. £3 10s.

While binding the 'Encyclopaedia Britannica', a young apprentice read the article on electricity. He saved up 7d. and bought two bottles, one of which became the cylinder of an electrostatic generator and the other a Leyden jar. Michael Faraday had begun his scientific career.

He attended Davy's chemical lectures at the Royal Institution and became an assistant there, and for half a century he brought the Royal Institution as much fame as he achieved himself. In 1827 he was offered the chair of chemistry at London University, but fortunately for the development of electrical science he refused, and he began the great series of experimental researches that soon led to electromagnetic induction and the laws of electrolysis—discoveries that later formed the basis of the electrical industries. Tyndall described Faraday as 'the prince of experimenters', but Prof. L. Pearce Williams shows convincingly that his unorthodox theoretical views were also of great importance in the development of field theory by Maxwell and others.

Prof. Williams has studied unpublished manuscripts in many libraries while preparing this book, and has embellished it with numerous portraits (many of them early photographs) and illustrations of Faraday's apparatus. His authoritative and eminently readable account of Faraday's life and work can be recommended to all electrical engineers interested in their scientific ancestors.

W. A. SMEATON

Books received

The transistor—basic theory and applications (4th edition) by Joachim Dosse. Van Nostrand, 1965. 283 pp. £2 15s. [Latest developments in Planar, POB and Madt transistors have been added, together with the latest developments in transistor technology]

European miniature electronic components and assemblies data. Part 1—Germany and Italy, 1955-56 edited by G. W. A. Drummer and J. Mackenzie Robertson. Pergamon, 1965. 1193 pp. £12 10s. [Contains a glossary of microelectronic terms, some 250 selected abstracts relating to the component and assemblies field, tables, charts and application formulas]

Ionized gases (2nd edition) by A. von Engel. Oxford University Press, 1965. 325 pp. £2 15s. [A textbook for undergraduates and research workers in the fields of discharge and plasma physics]

The science dictionary in basic English edited by E. C. Graham. Evans, 1965. 568 pp. 30s. [25 000 explanations of words taken from all branches of physics, chemistry, geology and other sciences, as well as engineering, aeronautics and metallurgy]

Worked examples in electronics and telecommunications by B. Houldsworth and Z. E. Jaworski. Iliffe, 1965. Vol. 1 209 pp. 25s. Vol. 2 134 pp. 22s. 6d. [Written specifically to meet the needs of students preparing for the B.Sc. final examinations in electronics and electrical engineering]

Tensor analysis of networks by Gabriel Kron. Macdonald, 1965. 635 pp. £3 10s. [An unrevised republication of the text which first appeared in the United States in 1939]

Pulse generators in industrial electronics edited by Sheldon Littwin. Iliffe, 1965. 128 pp.

Progress in radio science 1960-63 Vol. 8—Space radio science edited by K. I. Maeda and S. Silver. Elsevier, 1965. 235 pp. £3 15s.

Histological techniques for electron microscopy (2nd edition) by D. C. Pease. Academic Press, 1964. 381 pp. $9.50

Applied mathematics for engineers and students (2nd edition) by S. A. Schelkunoff. Van Nostrand, 1965. 496 pp. £3 13s. 6d. [Based on the author's experience, and that of his colleagues at Bell Telephone Laboratories, in applying mathematics to a wide variety of problems. Three new chapters (solving by series, partial fractions and summation) have been added]

Rewinding small motors by Karl Wilkinson. Newnes, 1965. 126 pp. 10s. 6d.

Instruments electronics automation year book and buyers guide edited by T. G. Williams. Morgan Brothers, 1965. 568 pp. £2 10s. [Reference work for use by technical and commercial departments in industry and by those engaged in research]

Notes for radio mechanics. Part 3—elementary radar. HMSO, 1965. 165 pp. 17s. 7d.

Zur Sicherheit der Hochspannungsfreileitungen bei hoher mechanischer Beanspruchung Düsseldorf: VDI-Verlag, 1964. 52 pp. DM 27.75 [On the reliability of overhead transmission lines under high mechanical load'. This critical analysis of the mechanical behaviour of stressed cable samples for overhead transmission lines deals with methods for studying aeolian-vibration risks and suggests new constructions of improved reliability]